



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/612,260

07/07/2000

Guy M. Cohen

YOR9-2000-0174

7116

28211

7590

06/30/2004

FREDERICK W. GIBB, III

MCGINN & GIBB, PLLC

2568-A RIVA ROAD

SUITE 304

ANNAPOLIS, MD 21401

EXAMINER

KANG, DONGHEE

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 06/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/612,260	Applicant(s) COHEN ET AL.	
	Examiner Donghee Kang	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13, 15-20, 44 and 55-74 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11-13, 15-20, 44 and 56-62 is/are allowed.
- 6) ☒ Claim(s) 1-4, 7, 8, 55 and 65-74 is/are rejected.
- 7) ☒ Claim(s) 5-6 & 9-10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims **1, 4, 7, 8 & 55** are rejected under 35 U.S.C. 102(b) as being anticipated by Goto (JP 05226655).

Re claim **1**, Goto teaches a transistor comprising (Fig.1):

A channel region (9); a first gate on the top of said channel region; a second gate below said channel region; and source and drain regions (14) laterally adjacent said channel region, wherein said channel region includes an extension into said source and drain regions.

Re claim **4**, Goto teaches the transistor further comprising a first gate dielectric below said first gate and a second gate dielectric above said second gate.

Re claim **7**, Goto teaches said first gate comprises a different thickness than said second gate.

Re claim **8**, Goto teaches said first gate, said second gate and said channel region form a planarized structure.

Re claim **55**, Goto teaches a transistor comprising (Fig.1):

A substrate (7) having a crystal orientation; a single crystal channel (9) above said substrate, wherein the crystal orientation of said single crystal channel independent

of said crystal orientation of said substrate; a first gate above said single crystal channel; and a second gate below said single crystal channel.

3. Claims **65, 68, 71 & 72** are rejected under 35 U.S.C. 102(b) as being anticipated by Taur et al. (US 5,646,058).

Re claim **65**, Taur et al. teach a transistor comprising (Fig.2):

A channel region; a first gate (30) on top of said channel region; a second gate (34) below said channel region; an isolation layer (oxide) below said second gate; and source and drain regions laterally adjacent said channel region, wherein said source and drain regions are self-aligned with said first gate and said second gate, such that said source and drain regions do not horizontally overlap said first gate or said second gate, and wherein said first gate and said second gate are electrically separated from each other.

Re claim **68**, Taur et al. teach the transistor further comprising a first gate dielectric below said first gate and a second gate dielectric above said second gate.

Re claim **71**, Taur et al. teach said first gate comprises a different thickness than said second gate.

Re claims **72**, Taur et al. teach said first gate, said second gate and said channel region form a planarized structure.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2811

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims **2-3** are rejected under 35 U.S.C. 103(a) as being unpatentable over Goto (JP 05-226655).

Goto teaches substantially the entire claimed structure, applied to claim 1 as explained above, except that the first gate comprising a different doping concentration and doping species than said second gate. It is, however, conventional in the art to select the concentration of gate electrode to adjust a threshold voltage in the transistor. If the first gate electrode has a lower concentration than the second gate electrode, a threshold voltage of the first gate is lower than that of the second gate. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed Goto's "first and second gate" having a different concentration, since the different concentration of gate electrode provides the different threshold voltage in device.

6. Claims **66-67** are rejected under 35 U.S.C. 103(a) as being unpatentable over Taur et al.

Taur et al. teach substantially the entire claimed structure, applied to claim 65 as explained above, except that the first gate comprising a different doping concentration and doping species than said second gate. It is, however, conventional in the art to select the concentration of gate electrode to adjust a threshold voltage in the transistor.

If the first gate electrode has a lower concentration than the second gate electrode, a threshold voltage of the first gate is lower than that of the second gate. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed Taur's "first and second gate" having a different concentration, since the different concentration of gate electrode provides the different threshold voltage in device.

7. Claim **69** is rejected under 35 U.S.C. 103(a) as being unpatentable over Taur et al. in view of Uesugi et al. (US 5,708,286).

Taur et al. applies to claim 1 above.

Taur et al. fail to teach the first conductive contact of first gate and second conductive contact of second gate are coplanar. However, Uesugi teaches in Fig.1 & Col.7, lines 42-46 the first conductive contact (80) of first gate (60) and second conductive contact (90) of second gate (30) are coplanar. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Uesugi with Taur's device in order to reduce the manufacturing process.

8. Claim **70** is rejected under 35 U.S.C. 103(a) as being unpatentable over Taur et al. in view of Pfiester (US 5,166,084).

Taur et al. do not teach the first gate comprising a different material than said second gate. However, Pfiester teaches in Fig.4 the first gate electrode (24) comprising a different material than said second gate electrode (26). Therefore, it would have been

Art Unit: 2811

obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Pfiester into Taur's device, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

9. Claims **73 & 74** are rejected under 35 U.S.C. 103(a) as being unpatentable over Taur et al. in view of Yamanaka (US 5,834,797).

Taur et al. do not teach the first gate dielectric comprising a different thickness than said second gate dielectric. Yamanaka teaches said first gate dielectric comprises a different material than said second gate dielectric. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Yamanaka into Taur's device, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Allowable Subject Matter

10. Claims **11-13, 15-20, 44 & 56-64** are allowed.

Claims **5-6 & 9-10** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Art Unit: 2811

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 571-272-1656. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Donghee Kang
Primary Examiner
Art Unit 2811

dhk